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Applicant PALVIAINEN, Keijo	

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From the INTERNATIONAL BUREAU

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:

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Date of mailing (day/month/year) 29 June 2000 (29.06.00)		
Applicant's or agent's file reference 2980668PC/nu		IMPORTANT NOTICE
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Applicant NOKIA NETWORKS OY et al		Priority date (day/month/year) 21 December 1998 (21.12.98)

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
AU,CN,JP,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

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The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 29 June 2000 (29.06.00) under No. WO 00/38461

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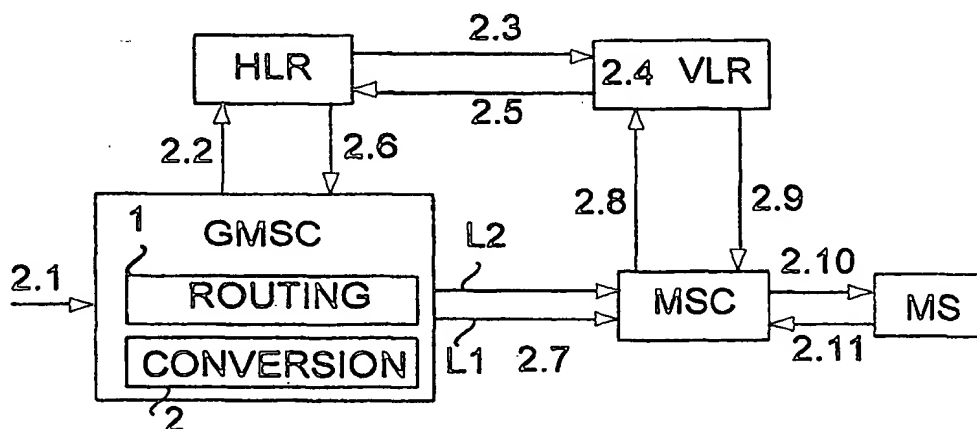
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(21) International Application Number: PCT/FI99/01063 (22) International Filing Date: 21 December 1999 (21.12.99) (30) Priority Data: 982762 21 December 1998 (21.12.98) FI (71) Applicant (for all designated States except US): NOKIA NETWORKS OY [FI/FI]; Keilalahdentie 4, FIN-02150 Espoo (FI). (72) Inventor; and (75) Inventor/Applicant (for US only): PALVIAINEN, Keijo [FI/FI]; Halmetie 6 A, FIN-00700 Helsinki (FI). (74) Agent: KOLSTER OY AB; Iso Roobertinkatu 23, P.O. Box 148, FIN-00121 Helsinki (FI).		(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KR (Utility model), KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published Without international search report and to be republished upon receipt of that report.	

(54) Title: CALL ROUTING



(57) Abstract

The present invention relates to a mobile communication system comprising: at least one subscriber database (HLR) containing subscriber data, and exchanges (GMSC, MSC) connected to each other by communication paths (L1, L2), at least one of said exchanges (GMSC) comprising means for transmitting a request (2.2) to said subscriber database (HLR), said request including at least a B-subscriber number of a terminating call. To provide a system which is capable of selecting the optimum communication path for a terminating call said subscriber database (HLR) comprises means for retrieving and transmitting to said exchange (GMSC) a basic service code that corresponds to the B-subscriber number included in the request (2.2), and said exchange (GMSC) comprises means (1) for routing said terminating call to the B-subscriber number by using communication paths (L1) that fulfill the property requirements of the call type indicated by said basic service code.

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Call routing

The present invention relates to telecommunication systems and especially to a solution for routing a mobile terminating call.

5 Modern mobile communication systems provide mobile stations with different data transmission properties in addition to conventional speech transmission. Mobile system services can be divided generally into teleservices and bearer services. A bearer service is a telecommunication service that constitutes the transmission of signals between user-network
10 interfaces. For example modem services are bearer services. In a teleservice, the network also provides terminal services. Important teleservices in turn include speech, facsimile and videotex services.

One mobile subscriber may typically have access to different tele- and bearer services that are referred to in this connection as basic services. A
15 subscriber may use for example a speech, facsimile and data service. A call terminating at or originating from a mobile station may therefore require any of these basic services, and therefore the correct service must be indicated to the mobile network. For example in a GSM mobile system, call set-up signaling transmitted by a mobile station contains data about the required
20 basic service in a bearer capability information element (BCIE). In this manner, the mobile network is able to select the correct basic service for calls originating from the mobile station. Calls arriving from an Integrated Services Data Network (ISDN) also contain a corresponding information element that indicates the required service. However, if the call arrives from an analog
25 Public Switched Telephone Network (PSTN) or travels through it, the mobile network does not receive such data concerning the service type of the call or the applicable Transmission Medium Requirement (TMR). In such a case, the mobile network should know in some other manner the type of the call in order to be able to route it on appropriate transmission paths.

30 A known solution to provide information about the call type is to use a multi numbering scheme, where a mobile subscriber has as many directory numbers as he has services to which he wants to receive incoming calls. The number is also called the mobile subscriber ISDN number, i.e. MSISDN. For example, a subscriber may have a number for a speech service,
35 a facsimile service and a modem service. In a multi numbering scheme, the calling subscriber, in other words the A-subscriber, selects from the mobile

subscriber's numbers the B-subscriber number corresponding to the desired service. This prior art solution makes it possible to provide information to the Home Location Register (HLR) of the called mobile station, in other words the B-subscriber, about the type of the terminating call. However, it is not sufficient
5 that only the HLR register is informed about the call type but instead this information should be provided for the network elements that route the call to the B-subscribers. The problem with prior art solutions has been that the HLR register has not been able to provide the necessary information about the call type for the other network elements in such a way that also older existing
10 exchanges would be able to utilize this information efficiently.

The object of the invention is to provide a solution which enables routing of a call in a mobile communication system in an optimal manner which takes into account the call type, and which requires as few modifications as possible to the existing network elements. These objects are achieved with a
15 method of routing a terminating call in a mobile communication system comprising exchanges which are connected to each other by communication paths, and at least one subscriber database containing subscriber data, said method comprising: transmitting a request from a routing exchange to said subscriber database, said request including at least a B-subscriber number of
20 said terminating call. The method of the present invention is characterized by retrieving a basic service code for said terminating call from said subscriber database on the basis of the B-subscriber number included in the request, transmitting a response from said subscriber database to said routing exchange, said response including at least said basic service code, and
25 routing said terminating call from the routing exchange to said B-subscriber number by using communication paths that fulfill the property requirements of the call type indicated by said basic service code.

The present invention also relates to a mobile communication system in which the method of the present invention can be used. The mobile
30 communication system of the invention comprises: at least one subscriber database containing subscriber data, and exchanges connected to each other by communication paths, at least one of said exchanges comprising means for transmitting a request to said subscriber database, said request including at least a B-subscriber number of a terminating call. The mobile communication
35 system is characterized in that said subscriber database comprises means for retrieving and transmitting to said exchange a basic service code that

corresponds to the B-subscriber number included in the request, and said exchange comprises means for routing said terminating call to the B-subscriber number by using communication paths that fulfill the property requirements of the call type indicated by said basic service code.

5 The invention also relates to an exchange of a mobile communication system which can be used in the mobile communication system of the present invention. The exchange according to the invention comprises: means for transmitting a request that includes at least a B-subscriber number of a terminating call, and routing means for routing
10 terminating call. The exchange of the present invention is characterized in that said exchange comprises means for receiving a basic service code, and that said routing means are responsive to the received basic service code for routing said terminating call to the B-subscriber number by using a communication path that fulfills the property requirements of the call type
15 indicated by said basic service code.

The present invention is based on the idea that the exchange which is routing the call is provided with the basic service code of the terminating call. The basic service code indicates the type of the call, and thus the routing exchange is able to determine the properties, for instance quality or
20 transmission speed, that are required by the terminating call. This makes it possible to select the communication paths with the appropriate properties when the call is routed to the B-subscriber number.

The most significant advantages of the present invention are thus that a terminating call from an analog network can be routed in an optimal
25 manner in view of the call type, even though the analog network does not provide any information about the call type. The present invention makes it possible to provide the routing exchange with the basic service code that indicates the call type without any significant changes to existing standards, as this information can be transmitted from the subscriber database to the
30 exchange for instance in a SendRoutingInfoResE message which in existing systems already is transmitted from the Home Location Register (HLR) to the routing exchange.

In a preferred embodiment of the exchange of the present invention, the exchange is provided with means for converting the
35 Transmission Medium Requirement (TMR) of the terminating call according to the call type indicated by the basic service code. Analog networks are not

capable of indicating the correct TMR to the exchange of modern digital mobile communication systems. However, the exchanges of present mobile communication systems are capable of indicating the correct TMR to each other when the call is routed. Thus it is sufficient if the first exchange, in other words the Gateway Mobile Switching Centre, can make the necessary TMR conversion for the terminating call. The converted TMR is then forwarded to the other exchanges which participate in the call establishment in a manner known per se. Thus, the other exchanges are capable of routing the call to the appropriate communication paths based on the TMR. Thus the invention can be used with already existing exchanges, and it is sufficient to only make changes to the first exchange GMSC.

In another preferred embodiment of the exchange of the present invention the exchange is provided with means for subjecting the B-subscriber number to a predetermined conversion selected according to the call type indicated by the basic service code. In this preferred embodiment the first exchange GMSC modifies the B-subscriber number for instance by adding a specific predetermined prefix to the number. This prefix is selected such that the other exchanges which participate in the call establishment of the terminating call are able to select suitable communication paths for the call type based on the prefix.

The preferred embodiments of the method, mobile communication system and exchange of the present invention are disclosed in the accompanying dependent claims 2, 4 - 6 and 8 - 9.

The invention will be described in greater detail in connection with preferred embodiments and with reference to the accompanying drawings, in which

Figure 1 is a block diagram illustrating the basic components of a GSM system,

Figure 2 illustrates the set-up of a call terminating at a mobile station (MS) in a GSM-type mobile system,

Figure 3 illustrates the general implementation of subscriber data in a home location register (HLR),

Figure 4 shows an example of a response from an HLR to an exchange, and

Figure 5 is a flow chart of a first preferred embodiment of the method of the present invention.

The present invention is applicable for use in mobile systems where circuit switched data and speech calls can be set up. The invention can be used especially in a GSM mobile system and in similar more recent mobile systems, such as the GSM 900, GSM1800 and the GSM 1900. In the following, the primary embodiment of the invention will be described in the GSM system, without restricting the invention thereto, however.

Figure 1 shows the basic components of the GSM system without describing in greater detail their properties or other parts of the system. For a more detailed description of the GSM system, reference is made to the GSM recommendations and The GSM System for Mobile Communications by M. Mouly and M. Pautet, Palaiseau, France, 1992, ISBN:2-9507190-0-0-7.

A mobile services switching centre MSC manages the switching of incoming and outgoing calls. It carries out similar functions as an exchange in a PSTN. In addition, it also performs functions, such as subscriber location management, that are only characteristic of mobile communication in connection with the network subscriber registers. In a GSM system, the subscriber registers include a home location register HLR and a visitor location register VLR. Subscriber data is stored permanently in the home location register HLR, as well as information on the visitor location register VLR in the area of which the MS is located. The visitor location register VLR in turn stores subscriber data of an MS temporarily while the MS is located in the area of the mobile services switching centre MSC connected to the visitor location register VLR. One visitor location register VLR typically serves one mobile services switching centre MSC. The MSs are connected to the mobile services switching centre MSC via base station systems BSS. A base station system BSS is formed of base station controllers BSC and base stations BTS. One base station controller BSC is used to control several base stations BTS.

Figure 2 illustrates the formation of a call terminating at a mobile station MS according to the present invention in a GSM-type mobile system utilizing a multi numbering scheme. In step 2.1, a call arrives at a first exchange GMSC of the network, which transmits a routing information request (message 2.2) to the subscriber home location register HLR that is determined according to the subscriber number MSISDN. The routing information request message 2.2 also contains the MSISDN, in other words the B-subscriber number. In location updating, the home location register HLR of the subscriber is provided with updated data about the visitor location register VLR in the

area of which the subscriber is located. On the basis of this data, the home location register HLR transmits a roaming number allocation request (message 2.3) to the visitor location register VLR. With the roaming number allocation request the visitor location register VLR also receives an international mobile subscriber identity (IMSI) and the BCIE related to the called MSISDN (or the ISDN BCIE that arrived in the message 2.2), indicating for example the network resources required by the call but not the type of the basic service. The visitor location register VLR stores the BCIE it has received and allocates a mobile station roaming number (MSRN) (event 2.4). The visitor location register VLR transmits the allocated MSRN to the home location register HLR in a response message 2.5.

The Home Location Register comprises a register from which it is able to retrieve the basic service code corresponding to the B-subscriber number included in the request 2.2. The home location register is thus able to transmit a message 2.6 with the roaming number and the basic service code to the exchange GMSC that requested for the routing information. The roaming number space is determined such that a call is always directed to the visited MSC the visitor location register VLR of which has allocated the roaming number.

A routing means 1 of the exchange GMSC uses the information in the response 2.6 for routing the terminating call. In the example of Figure 2 the routing exchange GMSC is connected by two communication paths or lines L1 and L2 to the exchange MSC. Lines L1 and L2 are assumed to have different properties such that, for instance, line L1 is suitable for data calls and line L2 for ordinary speech calls. The exchange GMSC is able to determine the type of the terminating call which is indicated by the basic service code included in the response 2.6. Thus, if the basic service code indicates that the terminating call is a data call, then the GMSC selects line L1 when it routes the call to the exchange MSC. Correspondingly, if the basic service code indicates that the terminating call is a data call, then the GMSC selects line L1 when it routes the call to the exchange MSC.

The exchange GMSC also comprises conversion means 2, which convert the information relating to the terminating call such that subsequent exchanges of the mobile communication system are able to route the call over the appropriate lines. This can be achieved such that the conversion means convert the Transmission Medium Requirement (TMR) of the terminating call

when ISDN signaling (ISUP) is in use. Existing prior art exchanges in mobile communication systems which utilize ISDN signaling are capable of selecting appropriate communication paths based on the TMR. However, an analog PSTN network is not able to provide the GMSC with the correct TMR. Thus, according to the present invention, the exchange GMSC communicates with the HLR register in order to obtain the basic service code of the terminating call, and on the basis of this information it converts the TMR of the terminating call such that the other exchanges of the network are able to use it and to select an appropriate line for the call.

Another alternative for providing information about the call type to the subsequent exchanges is that the conversion means 2 convert the B-subscriber number in a predetermined manner, for instance by adding a prefix to the B-subscriber number. This prefix is selected such that it informs the subsequent exchanges about the call type.

When the exchange GMSC has received the response 2.6, identified the call type and carried out the necessary conversions it transmits an initial message 2.7 to the exchange MSC indicated by the roaming number. This initial message is transmitted on line L1 or line L2 depending on the call type.

After the exchange MSC has received the initial address message 2.7, it finds during the roaming number analysis that the call is about to terminate in its own area and should not be forwarded. In such a case, the exchange MSC asks for the data of the called subscriber from its own visitor location register VLR for the purpose of call set-up (message 2.8). In a normal situation, the visitor location register VLR returns the required data, including for example the BCIE, in a response message 2.9. If the exchange MSC is capable of providing the data transmission resources indicated by the BCIE, the call set-up signaling illustrated by arrows 2.10 and 2.11 will be carried out between the exchange MSC and the mobile station MS.

As described above, modern mobile systems support different tele- and bearer services. The GSM bearer services are determined in GSM recommendation 02.02 and the teleservices in GSM recommendation 02.03. A separate teleservice and bearer service code is determined for each teleservice and bearer service in recommendation 09.02. For example, the teleservice code of the speech service is 00010001 and the teleservice code of the short messages originating from a mobile station is 00100010. In this

specification, all service codes are called basic service codes. One mobile subscriber may have access to different tele- and bearer services, which are referred to in this connection as basic services. As described above, it is preferable to use a multi numbering scheme, where each basic service is allocated an individual MSISDN.

In a GSM system, subscriber services are specified in a subscriber home location register HLR with the other subscriber data. Figure 3 illustrates the general implementation of subscriber data in the home location register HLR for a subscriber that has access to n basic services. The subscriber has his own IMSI that is used as subscriber identification within the mobile network. The services specified for the subscriber are related to the subscriber IMSI. According to the principle of the multi numbering scheme, each subscriber service 1 to n is given an individual number MSISDN-1 to MSISDN-n. Each MSISDN is related to one basic service code SC-1 to SC-n that determines the service. The basic service code is one of the aforementioned tele- and bearer service codes.

Figure 4 shows an example of a response (SendRoutingInfoResE, SRI-Res) from an HLR to a request for routing information. In the embodiment described herein, the response message returns the basic service code SC-n ([9]basicService) related to the called party number (B-subscriber number) and stored in the HLR to the exchange that made the routing request. According to the invention, the exchange GMSC identifies the type of the service on the basis of the basic service code and selects a line, in other words a communication path, for routing the call to the B-subscriber number according to the type of call indicated by the basic service code. The communication path is selected such that the exchange selects from several optional lines with different properties, a line that fulfills the property requirements of the call type in question.

Figure 5 is a flow chart of a first preferred embodiment of the present invention. The flow chart of Figure 5 can be used for instance in a GSM system where a multi numbering scheme is used.

In block A a first exchange GMSC of a mobile communication system receives information for a call terminating at a mobile subscriber. The call originated from an analog PSTN network, and thus the GMSC does not receive information which would make it possible to identify the call type. The

GMSC transmits a routing request with the B-subscriber number to the Home Location Register HLR of the mobile station in question.

In block B the HLR register retrieves the basic service code corresponding to the B-subscriber number. The HLR also transmits a roaming
5 number request to a VLR register and receives a Mobile Station Roaming Number (MSRN) (as described in more detail in connection with Figure 2).

In block C the HLR register transmits a response (SendRoutingInfoResE, SRI-Res) to the GMSC. Said response includes the retrieved basic service code of the terminating call.

10 In block D the GMSC converts the information relating to the terminating call such that subsequent exchanges, which also participate in the routing of the terminating call, are able to route the call on communication paths with appropriate properties for the call type in question. In a system
15 where ISDN signaling (ISUP) is in use, this can be achieved for instance such that the Transmission Medium Requirement (TMR) of the terminating call is converted according to the call type indicated by the basic service code.

In block E the GMSC routes the call to the B-subscriber number by using a communication path with appropriate properties for the call type in question.

20 It should be understood that the above description and the related drawings are only intended to illustrate the present invention. Thus variations and modifications from the description will be apparent to those skilled in the art without departing from the scope and spirit of the invention disclosed in the attached claims.

Claims

1. A method of routing a terminating call in a mobile communication system comprising exchanges which are connected to each other by communication paths, and at least one subscriber database containing subscriber data, said method comprising:
- 5 transmitting a request from a routing exchange to said subscriber database, said request including at least a B-subscriber number of said terminating call, characterized by
- 10 retrieving a basic service code for said terminating call from said subscriber database on the basis of the B-subscriber number included in the request,
- transmitting a response from said subscriber database to said routing exchange, said response including at least said basic service code,
- 15 and
- routing said terminating call from the routing exchange to said B-subscriber number by using communication paths that fulfill the property requirements of the call type indicated by said basic service code.
2. A method according to claim 1, characterized in that said
- 20 subscriber database is a home location register, and that said response is a SendRoutingInfoResE message wherein the basic service code is included.
3. A mobile communication system comprising:
- at least one subscriber database (HLR) containing subscriber data,
- and
- 25 exchanges (GMSC, MSC) connected to each other by communication paths (L1, L2), at least one of said exchanges (GMSC) comprising means for transmitting a request (2.2) to said subscriber database (HLR), said request including at least a B-subscriber number of a terminating call, characterized in that
- 30 said subscriber database (HLR) comprises means for retrieving and transmitting to said exchange (GMSC) a basic service code that corresponds to the B-subscriber number included in the request (2.2), and
- said exchange (GMSC) comprises means (1) for routing said terminating call to the B-subscriber number by using communication paths (L1)
- 35 that fulfill the property requirements of the call type indicated by said basic service code.

4. A mobile communication system according to claim 3, characterized in that said subscriber database (HLR) is a home location register, and that said response is a SendRoutingInfoResE message wherein the basic service code is included.

5 5. A mobile communication system according to claim 3 or 4, characterized in that said exchange (GMSC) comprises means (2) for subjecting the B-subscriber number to a predetermined conversion selected according to the call type indicated by the basic service code.

6. A mobile communication system according to claim 3 or 4,
10 characterized in that said exchange (GMSC) comprises means for converting the transmission medium requirement of the terminating call according to the call type indicated by the basic service code.

7. An exchange (GMSC) of a mobile communication system, said exchange comprising:

15 means for transmitting a request (2.2) that includes at least a B-subscriber number of a terminating call, and

routing means (1) for routing said terminating call,
characterized in

that said exchange (GMSC) comprises means for receiving a basic
20 service code, and

that said routing means (1) are responsive to the received basic service code for routing said terminating call to the B-subscriber number by using a communication path (L1) that fulfills the property requirements of the call type indicated by said basic service code.

25 8. An exchange according to claim 7, characterized in that said exchange (GMSC) comprises means (2) for subjecting the B-subscriber number to a predetermined conversion selected according to the call type indicated by the basic service code.

9. An exchange according to claim 7, characterized in that
30 said exchange (GMSC) comprises means (2) for converting the transmission medium requirement of the terminating call according to the call type indicated by the basic service code.

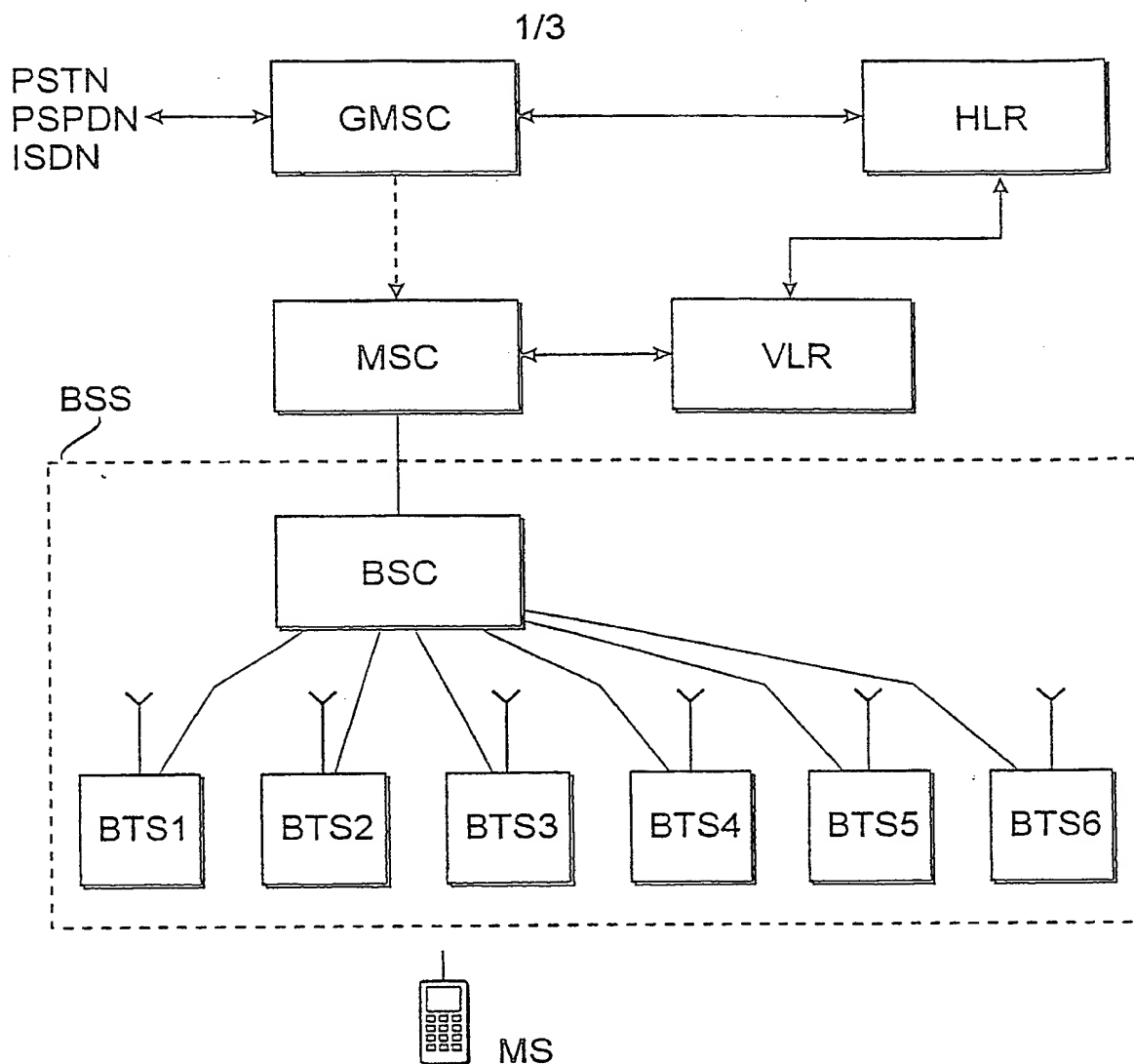


FIG. 1

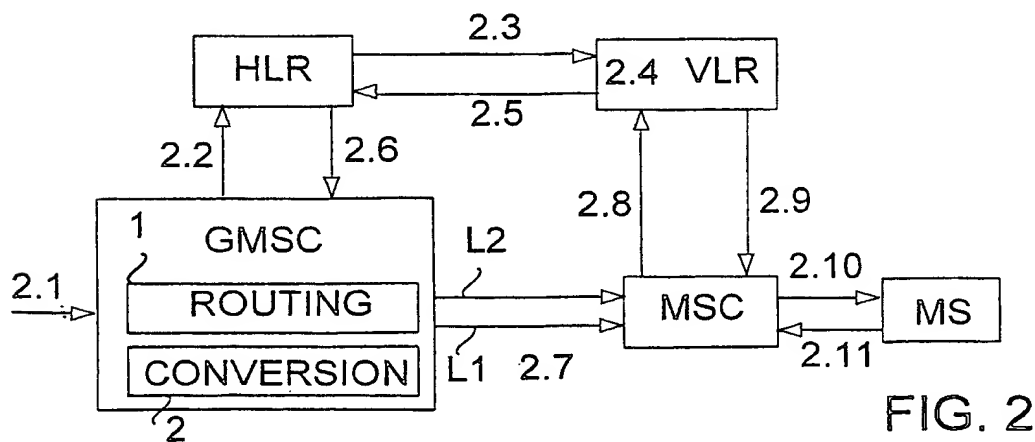


FIG. 2

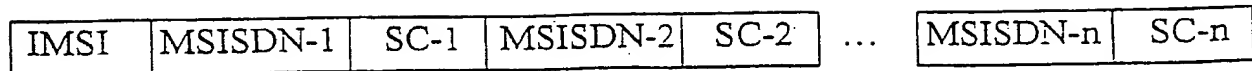


FIG. 3

```

SendRoutingInfoResE ::= SEQUENCE (
  imsi                      IMSI,
  routingInfo               RoutingInfo,
  cug-CheckInfo             CUG-CheckInfo    OPTIONAL,
  pni                      PnplIndex        OPTIONAL,
  sriResExtension [PRIVATE 0] SriResExtension OPTIONAL,
  ansiSriResExt   [PRIVATE 30] ANSISriResExt OPTIONAL
  ...)

```

```

SriResExtension ::= [PRIVATE 0] SEQUENCE (
  inTriggerKey   [0] InTriggerKey    OPTIONAL,
  vlrNumber      [1] ISDN-AddressString OPTIONAL,
  activeSs       [2] ActiveSS-List   OPTIONAL,
  traceReference [3] TraceReference  OPTIONAL,
  traceType      [4] TraceType       OPTIONAL,
  omc-Id         [5] AddressString    OPTIONAL,
  hotBilling     [6] BOOLEAN         OPTIONAL,
  cfoIsDone      [7] BOOLEAN         OPTIONAL,
  cfoInCug       [8] BOOLEAN         OPTIONAL,
  basicService   [9] BasicServiceCode OPTIONAL,
  category       [10] Category        OPTIONAL,
  routingCategory [11] RoutingCategory OPTIONAL,
  pnplIndex      [12] PnplIndex       OPTIONAL,
  nokia-CUG      [13] Nokia-CUG-Data OPTIONAL,
  noBarrings     [14] NULL            OPTIONAL,
  odb-Data       [15] ODB-Data       OPTIONAL
  ...)

```

FIG. 4

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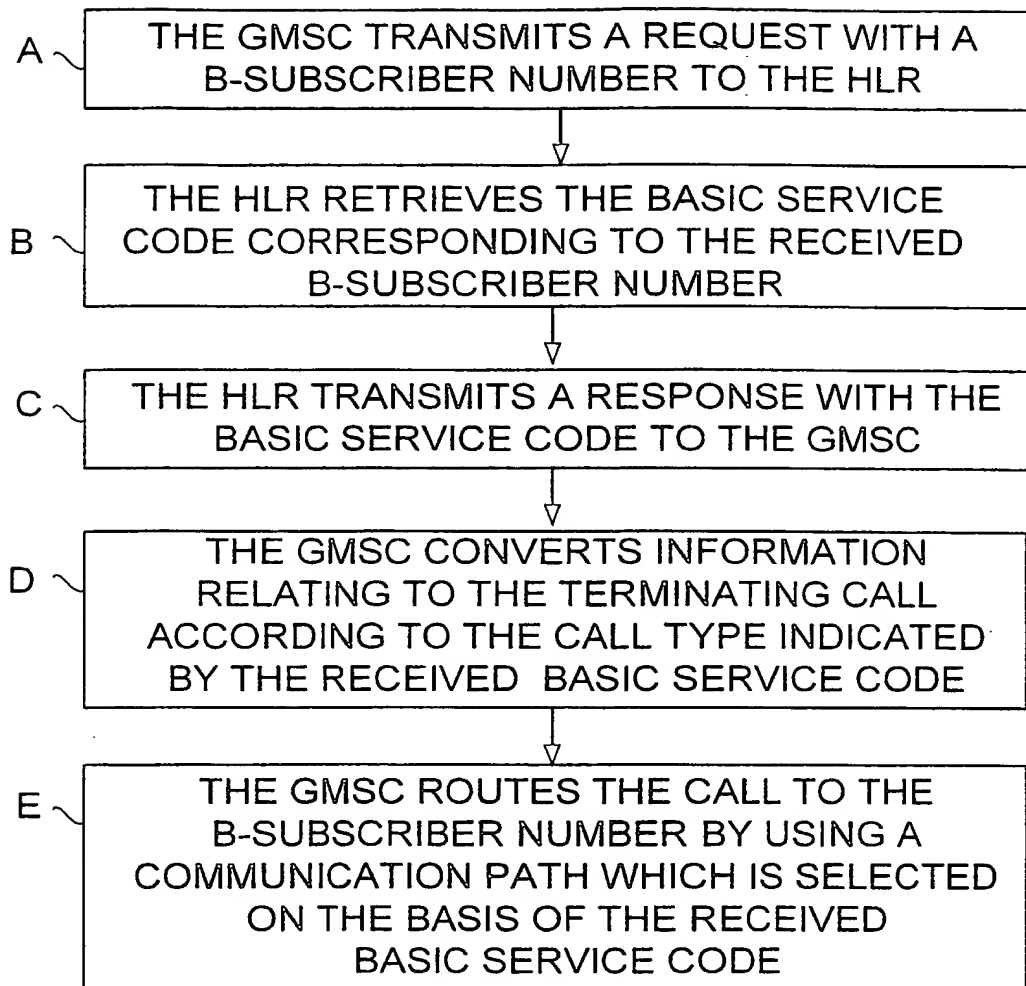


FIG. 5

REC'D 09 APR 2001

WIPO

PCT

Applicant's or agent's file reference 2980668PC/nu	FOR FURTHER ACTION		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. FI99/01063	International filing date (day/month/year) 21-12-1999	Priority date (day/month/year) 21-12-1998	
International Patent Classification (IPC) or national classification and IPC7 H04Q 7/38			
Applicant NOKIA NETWORKS OY et al			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☒ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 17-07-2000	Date of completion of this report 29-03-2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Eric Westin /itw Telephone No. 08-782 25 00

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI99/01063

I. Basis of the report

1. With regard to the **elements** of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the claims:
 pages _____, as originally filed
 pages _____, as amended (together with any statement) under article 19
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the drawings:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
 pages _____, as originally filed
 pages _____, filed with the demand
 pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI99/01063

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-9</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-9</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-9</u>	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The claimed invention relates to routing a mobile terminating call. The object of the invention is to arrange the HLR to provide the necessary information about the service type of the call for the other network elements in such a way that also older existing exchanges would be able to utilise this information efficiently. The solution according to the invention is achieved by a method and system for routing a terminating call in a mobile communication system comprising exchanges and at least one HLR (subscriber database). The method comprises (i) transmitting a request (including at least a B-subscriber number) from a routing exchange to the HLR, (ii) retrieving a basic service code from the HLR based on the request, (iii) transmitting a response (i.e. basic service code) to the exchange, and (iv) routing the call from the exchange to the B-subscriber using the communication paths that fulfil the property requirements of the call type indicated by the basic service code.

The following documents were cited in the International Search Report:

D1: WO9717816 A1
D2: WO9746031 A1
D3: WO9736450 A1
D4: WO9708912 A1
D5: WO9707643 A1
D6: DE19515558 C1

Documents D1-D3 represent the closest prior art.
In document D1 a mobile communication system and method for routing a mobile-terminating call employing a multi-numbering scheme is disclosed. ... / ...

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI99/01063

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

The allocated roaming number obtained from the visitor location register contains a section dependent on service required by call and indicative of appropriate route from the GMSC to the MSC. In the case of calls routed from the PSTN or via the PSTN, the GMSC is informed of the required service.

In document D2 a method for making telephone call by terminal is disclosed. The method involves converting prefix of number under control by intelligent network to enable access to number space to route call in intelligent network to subscription disclosed by converted prefix and number.

In document D3 a method for routing data signal to ported mobile station within telecommunication network is disclosed. The method involves transporting a telecommunication data signal to a mobile station relocated from one home location register to another.

The subject matter claimed in independent claims 1, 3 and 7 differs from what is known from documents D1-D6 in that the routing of the call is based on the basic service code.

Thus, the invention claimed in claims 1-9 is not disclosed in any of the cited documents D1-D6. Furthermore, the invention is considered not obvious since there are no indications that would prompt a person skilled in the art to solve the technical problem in accordance with the invention.

Consequently, the invention according to claims 1-9 is novel (N), and is also considered to involve an inventive step (IS) and has industrial applicability (IA).

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/FI99/01063

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
WO9901004 A1			
WO9933300 A1			

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/01063

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9717816 A1 (NOKIA TELECOMMUNICATIONS OY), 15 May 1997 (15.05.97), page 3, line 11 - page 4, line 19; page 4, line 32 - page 5, line 34, abstract --	1-9
X	WO 9746031 A1 (TELEFON AKTIEBOLAGET LM ERICSSON), 4 December 1997 (04.12.97), page 3, line 26 - page 4, line 1, abstract --	1,5
X	WO 9736450 A1 (ERICSSON INC), 2 October 1997 (02.10.97), page 2, line 28 - page 3, line 14, abstract --	1

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

& document member of the same patent family

Date of the actual completion of the international search

30 June 2000

Date of mailing of the international search report

03 -07- 2000

Name and mailing address of the ISA

Swedish Patent Office

Box 5055, S-102 42 STOCKHOLM

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Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/01063

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9708912 A1 (NOKIA TELECOMMUNICATIONS OY), 6 March 1997 (06.03.97), page 3, line 7 - line 27 --	1-9
A	WO 9707643 A1 (NOKIA TELECOMMUNICATIONS OY), 27 February 1997 (27.02.97), abstract --	1-9
A	DE 19515558 C1 (SIEMENS AG), 5 Sept 1996 (05.09.96), abstract --	1-9
P,X	WO 9901004 A1 (NOKIA TELECOMMUNICATIONS OY), 7 January 1999 (07.01.99), page 3, line 4 - page 5, line 9 --	1-9
P,A	WO 9933300 A1 (SONERA OY), 1 July 1999 (01.07.99), abstract -- -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.

PCT/FI 99/01063

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9717816 A1	15/05/97	AU 7301396 A CA 2236697 A EP 0872147 A FI 101119 B FI 955331 A	29/05/97 15/05/97 21/10/98 15/04/98 07/05/97
WO 9746031 A1	04/12/97	AU 2964797 A EP 0898842 A FI 103168 B FI 962282 A NO 985565 A	05/01/98 03/03/99 00/00/00 01/12/97 20/01/99
WO 9736450 A1	02/10/97	AU 2344597 A AU 2661497 A EP 0890283 A EP 0890287 A US 5839072 A US 5878347 A WO 9736451 A	17/10/97 17/10/97 13/01/99 13/01/99 17/11/98 02/03/99 02/10/97
WO 9708912 A1	06/03/97	AU 6661696 A FI 101183 B FI 953937 A	19/03/97 30/04/98 23/02/97
WO 9707643 A1	27/02/97	AU 6661796 A CA 2229636 A CN 1194084 A EP 0846400 A FI 101185 B FI 953917 A JP 11510659 T	12/03/97 27/02/97 23/09/98 10/06/98 30/04/98 22/02/97 14/09/99
DE 19515558 C1	05/09/96	EP 0740484 A	30/10/96
WO 9901004 A1	07/01/99	AU 7920398 A FI 972789 A	19/01/99 28/12/98
WO 9933300 A1	01/07/99	AU 1761799 A FI 974590 D FI 982168 A	12/07/99 00/00/00 23/06/99